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Original Research Article

Impact of COVID-19 on abortion method under ten weeks gestational age in Southern California^{☆,☆☆}Renee T. Sullender^a, Marni Jacobs^a, Kyle Bukowski^b, Antoinette Marengo^b, Sheila K. Mody^a, Sarah H. Averbach^{a,c,*}^a Department of Obstetrics, Gynecology and Reproductive Sciences, University of California San Diego, La Jolla, CA, United States^b Planned Parenthood of the Pacific Southwest, San Diego, CA, United States^c Center on Gender Equity and Health, University of California, San Diego, CA, United States

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ABSTRACT

Objective: We assessed the proportion of medication versus suction aspiration abortions before and after the onset of the COVID-19 pandemic in a health system that did not limit access to abortion.**Study Design:** We conducted an interrupted time series analysis among patients having an abortion at 10 weeks gestation or less at Planned Parenthood health centers in San Diego, Imperial, and Riverside Counties in California. Centers required in-person follow up for medication abortion throughout the pandemic. We compared the nine months prior to the pandemic (June 2019 to February 2020) to the first nine months of the pandemic (April 2020 to December 2020), with March 2020 as a washout period.**Results:** There was an average monthly increase of 0.78% in the proportion of medication abortions from June 2019 to February 2020 ($p = 0.01$, pre-pandemic trend). Immediately following the start of the pandemic, there was an estimated increase in the proportion of medication abortions of 2.58% ($p = 0.23$, post-level change). However, the monthly pre-pandemic trend towards medication abortions reversed by 1.07% after the start of the pandemic ($p = 0.02$, post-trend change), for an average monthly decrease in the proportion of medication abortions of 0.29% from April to December 2020 ($p = 0.37$, pandemic trend). **Conclusions:** The trend towards medication abortions that was present before the COVID-19 pandemic reversed after an initial increase in medication abortions at the start of the pandemic.

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Implications

Both types of abortion should remain available during public health emergencies. Further research is needed to understand how the pandemic affected abortion methods in areas with limited access and in health centers that did not require two in-person appointments for medication abortions.

1. Introduction

The COVID-19 pandemic has dramatically affected almost every aspect of health care [1]. Abortion, already the most heavily regulated medical procedure performed in the United States, is no

exception [2]. On March 14, 2020, the US Surgeon General asked healthcare systems to consider halting elective procedures to conserve resources [3]. During the pandemic, several states classified abortion as either “elective” or “non-essential,” effectively banning the service [4]. In response, the American College of Obstetricians and Gynecologists (ACOG), the Society of Family Planning (SFP), and other organizations released statements opposing cancelling or delaying abortion care [5].

The Guttmacher Institute found that 33% of women reported delaying or cancelling a health care visit for sexual or reproductive health or had trouble obtaining birth control during the pandemic [6]. More than a third of respondents reported a desire to delay having a child or to limit future births due to the pandemic. A study assessing abortion referrals from a database identified a significant increase in abortion referrals above expected historical levels in Northern California during the pandemic [7]. However, in some areas of the country, people have been turned away from abortion care because of COVID-related restrictions [8].

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* Corresponding author.

E-mail address: saverbach@health.ucsd.edu (S.H. Averbach).

During the first 10 weeks of gestation, there are two options for an induced abortion or management of an early pregnancy loss—either medication management or suction aspiration, sometimes called dilation and curettage. The medication abortion regimen most commonly used consists of mifepristone taken in the clinic (if available) and misoprostol taken at home 24 to 48 hours later [9]. A repeat ultrasound has often been required at many clinics, including at our study health centers, although SFP guidelines also support follow-up after medication abortion by an in-person assessment, hCG testing, and/or by telephone [9]. Even with two appointments, medication abortion could require less overall time in clinic than a suction aspiration, which could influence a person's decision making. Alternatively, some patients may elect for a suction aspiration because it has a higher success rate, causes less bleeding than medication abortions, and typically does not require a follow-up visit [9].

We sought to evaluate whether ongoing trends related to patients' choice of abortion method changed during the pandemic in health centers in which abortion remained accessible. Given the public health recommendations to socially distance and limit exposure to others, as well as increased difficulty obtaining transportation and childcare, we hypothesized that patients presenting for an abortion at or under 10 weeks of gestation would be more likely to select a medication abortion than a suction aspiration during the pandemic than prior to the pandemic.

2. Materials and Methods

2.1. Study Design

We conducted an interrupted time series to determine if the pandemic altered patients' choice of a medication abortion or suction aspiration at or below 10 weeks of gestational age (10 weeks, 0 days). We restricted our analysis to the first 10 weeks of gestation as this is the time period during which most patients had the option of either medical or surgical management during the time frame this study was conducted. The study population included individuals who sought either an induced abortion or management of an early pregnancy loss at a Planned Parenthood of the Pacific Southwest health center in San Diego, Imperial, and Riverside Counties, California. These health centers all required a second appointment for a follow-up ultrasound after a medication abortion, but not a suction aspiration, during the study period. Participating health centers offered medication abortion at 17 locations and suction aspiration at four locations—two of which operate once weekly. Three of the locations offering suction aspiration also offer medication abortions, and the fourth location is in the same building as another Planned Parenthood health center that offers medication abortions. The number of clinics and their services did not change during the study period. The Human Research Protection Programs at University of California, San Diego approved this study.

We abstracted participant demographics from the medical record including age, gestational age, gravidity, parity, race and/or ethnicity, and insurance status. We included patients at or under 10 weeks gestational age on the day of the suction aspiration procedure or receipt of mifepristone. We included patients who presented for management of multiple pregnancies during the study period.

2.2. Statistical Analysis

For the interrupted time series, we utilized time as a proxy for the pandemic so that we would be able to analyze changes as the pandemic spread and restrictions were implemented. A state of emergency was declared in the state of California on March 4, 2020

and a mandatory stay at home order was implemented on March 19, 2020. We compared the nine months prior to the pandemic (June 2019–February 2020) to the first nine months of the pandemic (April 2020–December 2020), following state restrictions. We did not include March 2020 in the analysis and we treated this month as a “washout” period given the multitude of new restrictions placed during this time. Thus, we treated the pandemic as an “intervention,” and we evaluated its impact on choice of abortion method (medication abortion or suction aspiration).

We compared demographic and clinical characteristics of the population between pre- and during-pandemic periods using student t-test for evaluation of differences in means for normally distributed variables, Wilcoxon-Mann-Whitney test for non-parametric continuous variables, and Chi-square tests for differences in proportions. Additionally, we constructed exact 95% confidence intervals around the estimate of medication abortion visits during the entire pre-pandemic timeframe and in the two months prior to the pandemic to examine whether estimates during-pandemic differed from historically observed estimates.

We completed an interrupted time series analysis using autoregressive segmented linear regression, with the interruption occurring between February 2020 and April 2020 (i.e., the March 2020 washout period). Using this methodology, we aimed to identify both a level change (immediate effect comparing pre-pandemic and during-pandemic abortion type), as well a slope change for a sustained effect in abortion type during the pandemic. Given the potential for seasonal trends in abortion, autocorrelation was tested allowing for lags up to a year. We conducted analyses using SAS 9.4; a 2 tailed alpha of 0.05 was considered significant.

3. Results

We identified 11,910 patients who met the inclusion criteria in the pre-pandemic time-period (June 2019–February 2020) who had an abortion encounter, 7,704 (64.7%) who underwent medication abortion, and 11,177 in the pandemic group (April 2020–December 2020), with 7,705 (68.9%) who underwent medication abortion (Table 1). When comparing pre- and during-pandemic values, we found a significant increase in the proportion of patients selecting medication abortion within the first 10 weeks of gestation ($p < 0.001$). The proportion of patients selecting medication abortion during-pandemic fell outside of the 95% confidence intervals for the overall pre-pandemic time-period (63.8%–65.5%); however, this proportion was consistent with estimates based on the two months immediately prior to pandemic onset when medication abortions were already increasing (68.4%, 95% CI 66.7%–70.1%).

Although there were statistically significant differences due to the large sample size, we found no meaningful differences that would result in clinical practice or policy changes between the pre- and during-pandemic populations by demographic characteristics (Table 1). Hispanic and/or Latinx patients made up almost half of the study population in both time periods.

The average age of the patients for medication abortions was older than that for suction aspiration pre-pandemic (Table 2). However, during the pandemic, younger patients chose medication abortions. The average gestational length for medication abortions for both time periods (6.7 and 6.6 weeks, respectively) was lower than that for suction aspiration (7.1 and 6.9 weeks) and decreased between the pre- and during-pandemic time periods for both abortion types ($p < 0.001$). All racial and/or ethnic groups were more likely to select a medication abortion than a suction aspiration for both time periods.

While the proportion of medication abortions was already trending upwards pre-pandemic, we saw a sharp increase in April 2020 with 73.8% of patients during that month choosing a medication abortion. However, this steep rise was not sustained through-

Table 1Characteristics of patients receiving abortions during the Pre-COVID Pandemic^a and Pandemic Time Periods^b.

	Pre-Pandemic n = 11,910 (51.6%)	Pandemic n = 11,177 (48.4%)	p-value
Method			< 0.001
Suction aspiration	4,206 (35.3%)	3,472 (31.1%)	
Medication abortion	7,704 (64.7%)	7,705 (68.9%)	
Characteristic			
Age (years)	27.3 (6.3)	27.1 (6.2)	0.02
Gestational age (weeks)	6.8 (1.3)	6.7 (1.2)	< 0.001
Gravidity	2 (1, 4)	2 (1, 4)	0.22
Parity	0 (0, 2)	0 (0, 2)	0.70
Race/ethnicity			< 0.001
White	2,770 (23.3%)	2,894 (25.9%)	
Black	987 (8.3%)	1,105 (9.9%)	
Hispanic/Latinx	5,630 (47.3%)	5,413 (48.4%)	
Asian/ Pacific Islander	509 (4.3%)	520 (4.6%)	
Other/unknown	2,014 (16.9%)	1,245 (11.1%)	
Insurance			< 0.001
Cash	2,329 (19.6)	2,519 (22.5)	
Commercial	2,144 (18.0)	2,008 (18.0)	
Public (medical assistance)	7,437 (62.4)	6,650 (59.5)	

All data are presented as n (%), mean \pm standard deviation, or median (interquartile range).^a Pre- Pandemic reflects June 2019-February 2020.^b Pandemic reflects April 2020-December 2020.**Table 2**Characteristics of patients receiving medication abortion versus suction aspiration during the Pre- COVID Pandemic^a and Pandemic Time Periods^b.

Characteristic	Pre-pandemic			Pandemic			Medication abortion pre- vs pandemic p-value
	Suction aspiration n = 4,206	Medication abortion n = 7,704	p-value	Suction aspiration n = 3,472	Medication abortion n = 7,705	p-value	
Age (years)	25.6 (6.4)	27.1 (6.2)	<0.001	27.5 (6.3)	26.9 (6.1)	< 0.001	0.05
Gestational age (weeks)	7.1 (1.3)	6.7 (1.2)	< 0.001	6.9 (1.3)	6.6 (1.2)	< 0.001	< 0.001
Gravidity	2 (1, 4)	2 (1, 4)	< 0.001	3 (1, 4)	2 (1, 4)	< 0.001	0.78
Parity	1 (0, 2)	0 (0, 2)	0.01	1 (0, 2)	0 (0, 2)	0.002	0.85
Race/ethnicity			<0.001			< 0.001	< 0.001
White	986 (23.4)	1,784 (23.2)		898 (25.9)	1,996 (25.9)		
Black	414 (9.8)	573 (7.4)		424 (12.2)	681 (8.8)		
Hispanic/Latinx	1,924 (45.7)	3,706 (48.1)		1,608 (46.3)	3,805 (49.4)		
Asian/Pacific Islander	185 (4.4)	324 (4.2)		154 (4.4)	366 (4.8)		
Other/unknown	697 (16.6)	1,317 (17.1)		388 (11.2)	857 (11.1)		
Insurance			0.37			0.02	< 0.001
Cash	839 (19.9)	1,490 (19.3)		731 (21.1)	1,788 (23.2)		
Commercial	776 (18.5)	1,368 (17.8)		611 (17.6)	1,397 (18.1)		
Public (medical assistance)	2,591 (61.6)	4,846 (62.9)		2,130 (61.3)	4,520 (58.7)		

All data are presented as n (%), mean \pm standard deviation, or median (interquartile range).^a Pre- Pandemic reflects June 2019- February 2020.^b Pandemic reflects April 2020-December 2020.

out the pandemic, with May 2020 rates (67.6%) going back down to similar levels immediately pre-pandemic.

Before the pandemic, there was an average monthly increase in the proportion of medication abortions of 0.78% ($p = 0.01$, pre-pandemic trend) from June 2019 to February 2020. The estimated increase in the proportion of medication abortions immediately following the pandemic onset was 2.58% ($p = 0.23$, post-level change). However, the increase was not sustained and began to flatten out. The monthly trend in the proportion of medication abortions noted pre-pandemic reversed by 1.07% ($p = 0.02$, post-trend change), resulting in an average monthly decrease in the proportion of medication abortions of 0.29% from April 2020 to December 2020 ($p = 0.37$, pandemic trend) Fig. 1. further illustrates the interrupted time series, showing first the pre-pandemic trend, the post-level change, and then the pandemic trend.

Autocorrelation function plots revealed no significant lags, and Durbin-Watson tests for autocorrelation were not significant. Additional interrupted time series analysis analyses stratified by county did not suggest a significant impact on effect estimates (data not shown). The average time spent in clinic was 168 minutes for a

suction aspiration as compared to 88 minutes for the first medication abortion appointment and 60 minutes for the post-medication abortion follow-up. There were no clinically significant changes in the no-show rate for our study sites' required follow-up appointments after medication abortions (40% pre-pandemic vs 39% pandemic, $p = 0.06$) (data not shown).

4. Discussion

We sought to examine whether the COVID-19 pandemic affected patients' choice of abortion type. The trend towards an increasing proportion of medication abortions prior to the pandemic ultimately reversed during the pandemic, after an initial spike in medication abortions from 67.8% in February 2020 to 73.8% April 2020. The negative value of the pandemic trend indicates a monthly decrease in the proportion of medication abortions compared to suction aspiration between April and December 2020. Therefore, despite a pre-pandemic trend towards medication abortion ($p = 0.01$) and a significant increase in the proportion of medication abortions during the pandemic compared to prior

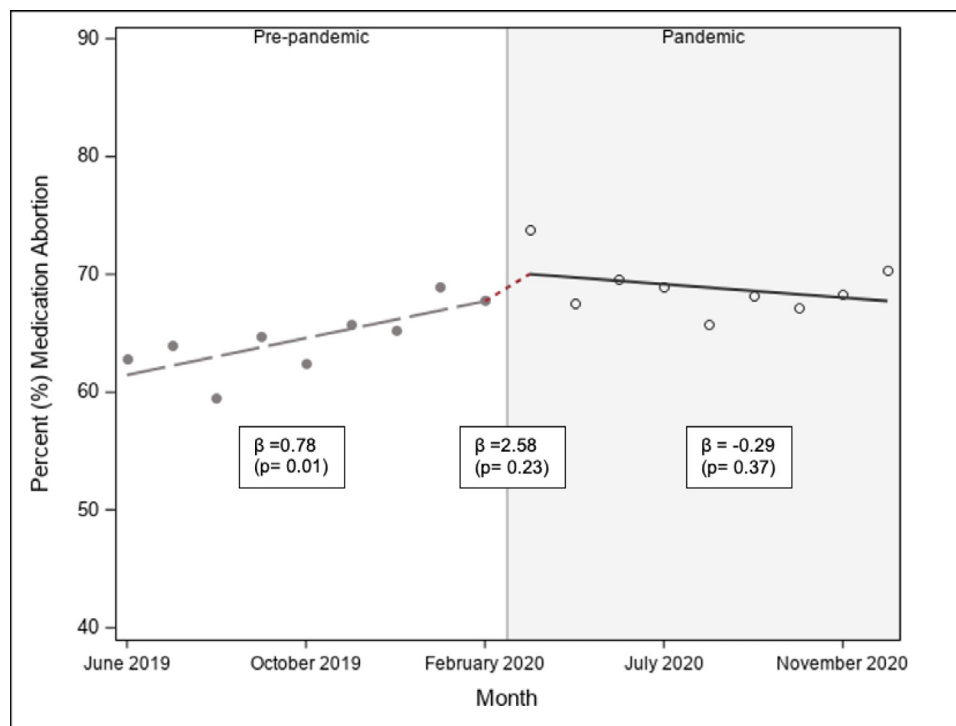


Fig. 1. Trends in proportion of medication abortion during nine months prior to the pandemic (June 2019 - February 2020) compared to the first nine months of the pandemic (April 2020 - December 2020) at planned parenthood sites in Southern California.

($p < 0.001$), pandemic proportions after April 2020 were overall similar to those seen immediately prior to the pandemic.

When evaluating March 2020 by week, there was an increase in the proportion of medication abortions from week three (67.5%) to week four (73.8%) when additional stay at home measures were put into place, suggesting that March was an appropriate “washout” period given the weekly changes. It may be that the stay-at-home order initially encouraged people to select medication abortions at the beginning of the pandemic to limit exposure.

An increase in medication abortions was likely easier for health centers to accommodate because they require less clinic time than suction aspiration. It is possible that our health centers’ continued requirement for a follow-up appointment after a medication abortion negatively impacted patient choice for this method and this may have contributed to the less than expected increase in medication abortions. Given many other clinics moved towards a single visit and/or no-test telemedicine model for medication abortion provision during the pandemic, our findings are not generalizable to these sites [10]. Alternatively, the leveling-off may instead reflect a maximum saturation of medication abortions that would have been realized even without the pandemic.

Telehealth was not available, but if offered there would have likely been an increase in medication abortions. There was a 27% increase in the rate of requests for medication abortion at home within the first month of the pandemic across the United States, with larger increases in states with more abortion restrictions [11]. In the United Kingdom, research during the pandemic found no difference between telemedicine abortion and traditional in-person care in terms of effectiveness or adverse events [12].

Study strengths include the size of our study and the diverse population. While no control group was available given the global impact of the pandemic, this pre-post comparison within the same population allowed us to control for the expected trend had the in-

tervention (pandemic) not occurred. The data was collected from a single Planned Parenthood affiliate with the same workflows, policies, and procedures at each health center that did not change during the pandemic. However, we were unable to account for any changes in individual staff counseling which may have influenced patient decision-making. There was a large decrease in the proportion of patients self-identifying as “other/unknown” by race and/or ethnicity (17% to 11%), with an increase in all other categories. While the source of the decrease is unclear as there were no changes to the system for ascertaining race and/or ethnicity, it may in part be attributable to the ability of multi-racial individuals to report different categories [13]. Although seasonal abortion trends have the possibility to affect our data given the months included in our time periods are not symmetrical, tests of autocorrelation did not suggest a need for adjustment for seasonality.

Limitations include the retrospective nature of the study, which impacted our ability to ascertain the reasons patients have for choosing their abortion type or if the abortion was induced or management of an early pregnancy loss. We were unable to assess if patients had contraindications to one abortion type versus another, though this is not expected to have been impacted by the pandemic and contraindications are rare. Our research was conducted in Southern California, which did not experience additional abortion restrictions during the pandemic. Further research is needed to understand how the pandemic affected abortion care in areas with limited reproductive access and at non-Planned Parenthood clinics.

Our findings have important implications for public health emergencies. Abortion is time-sensitive medical care and is not considered to be elective by major medical associations [5,14]. While medication abortions increased overall during the pandemic, the trend towards medication abortions that was already present pre-pandemic reversed, suggesting that we cannot focus solely on medication abortions during future pandemics. It remains essential

to ensure access to both medication abortions and suction aspiration during public health emergencies.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.contraception.2022.02.010](https://doi.org/10.1016/j.contraception.2022.02.010).

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